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Seawater Desalination Using An Advanced Small Integral Reactor – SMART

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Abstract

A concept of a dual-purpose integrated nuclear desalination plant coupled with the advanced small integral reactor SMART was established. The design concept of the plant aims to produce 40,000m^3/day of water with the MED process and to generate about 90 MWe of electricity. In order to examine the technical, economic, and safety considerations in coupling SMART with desalination, a preliminary analysis on water production costs and a safety review of potential disturbances of the integrated nuclear desalination plant have been performed. The results of economic evaluation show that the use of SMART for seawater desalination is either comparative to or more economical, with respect to the water production cost, than the use of fossil fuels in comparison with the data published by the IAEA. It was also found that any possible transient event of the desalination plant does not impact on the reactor safety. The key safety parameters of the transient events induced by the potential disturbances of the desalination plant are bounded by the limits of safety analysis of SMART.